Web Service Integration Report

1. Introduction

The objective of this assignment is to integrate external web services into a backend application using secure and structured methods. The project focuses on consuming the Open Weather Map API to fetch current weather data for both single and multiple cities. The assignment aims to develop understanding of web APIs, service integration, authentication mechanisms, and secure API communication.

2. Implementation Steps

The major development and configuration steps completed in this assignment include: 1. Cloning the collaborative GitHub repository for team development. 2. Installing project dependencies using 'npm install'. 3. Creating and configuring an .env file containing sensitive API keys and server configuration values. 4. Implementing Express routes, controllers, and service layers for fetching weather data. 5. Integrating JWT authentication middleware to protect API endpoints. 6. Testing the application thoroughly using Postman to verify successful responses. 7. Handling errors, invalid inputs, and network failures using custom middleware and try/catch logic.

3. Tools and Technologies Used

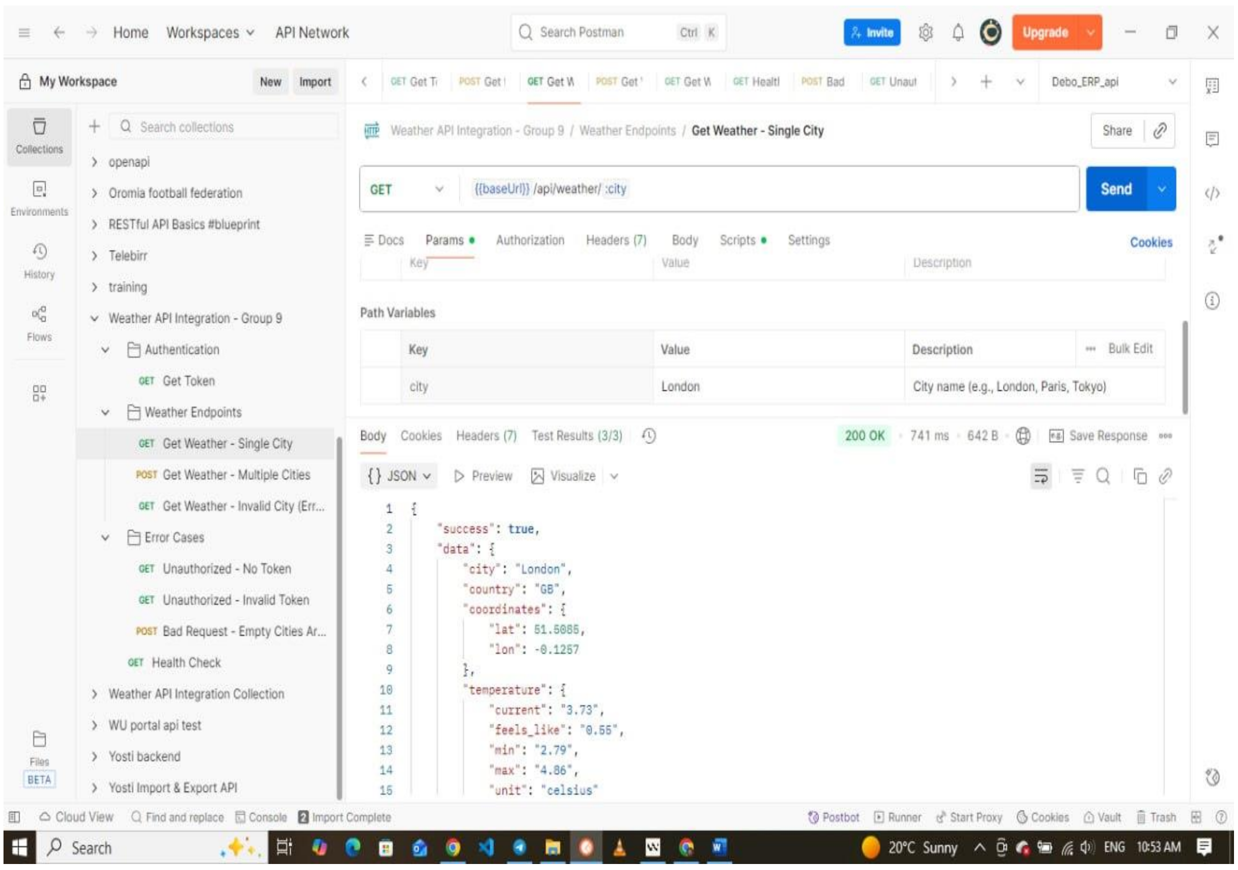
- Node.js (server-side JavaScript runtime)
- Express.js (backend web framework)
- Axios (HTTP client for API consumption)
- JSON Web Tokens (JWT) for authentication and security
- Postman(API testing platform)
- GitHub (version control and collaboration)
- Visual Studio Code (development environment)

4. Results and Observations

- JWT token generation works correctly.
- Weather data retrieval for single and multiple cities was successful.
- Invalid cities produce error responses and are logged in logs/errors.log

.- Postman tests confirmed authentication, headers, and API functionality.

4.1 Screenshot: Successful Single-City API Response



Weather API Integration - Group 9 / Weather Endpoints / Get Weather - Single City

GET {{baseUrl}} /api/weather/ :city

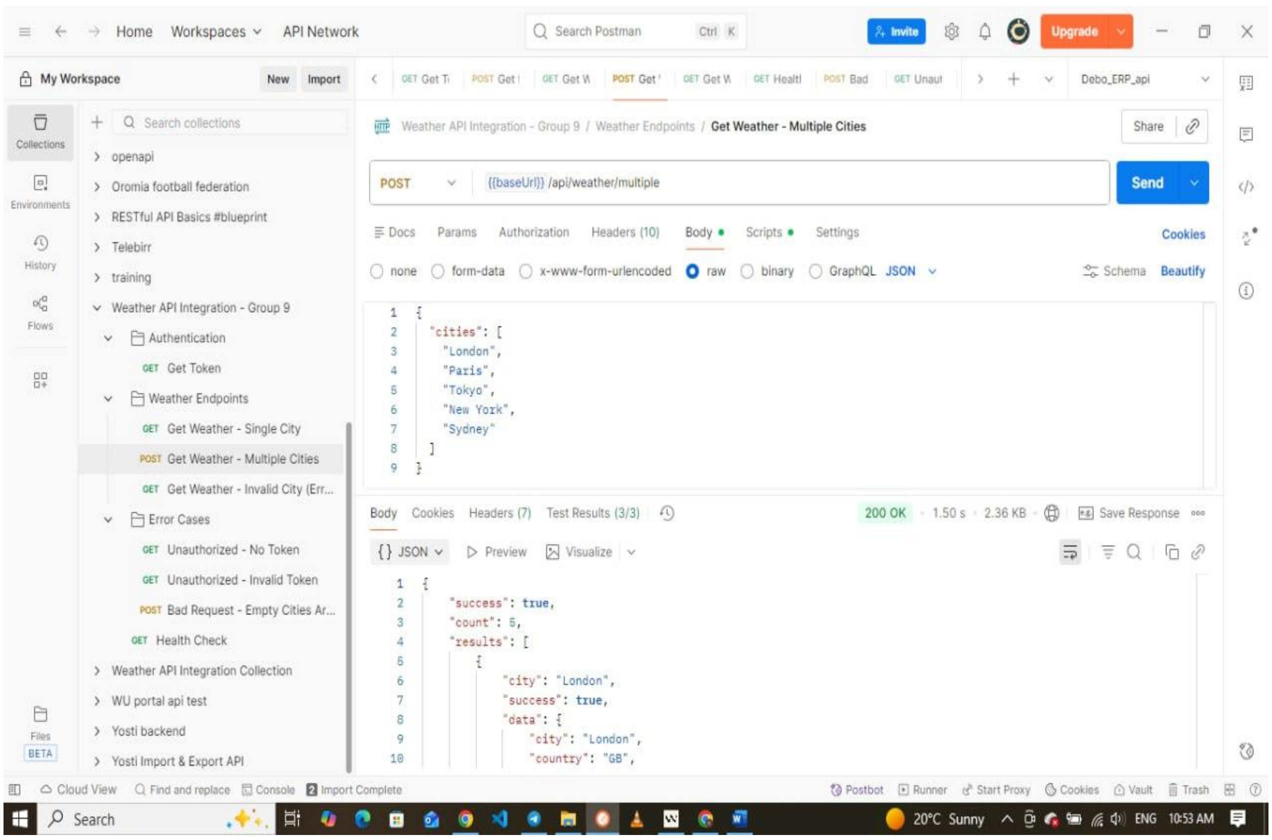
Path Variables

Key	Value	Description
city	London	City name (e.g., London, Paris, Tokyo)

Body Cookies Headers (7) Test Results (3/3) 200 OK · 741 ms · 642 B

```
{
    "success": true,
    "data": {
        "city": "London",
        "country": "GB",
        "coordinates": {
            "lat": 51.5085,
            "lon": -0.1257
        },
        "temperature": {
            "current": "3.73",
            "feels_like": "0.55",
            "min": "2.79",
            "max": "4.86",
            "unit": "celsius"
```

4.2 Screenshot: Successful Multiple-City API Response



My Workspace

- openapi
- Oromia football federation
- RESTful API Basics #blueprint
- Telebirr
- training
- Weather API Integration - Group 9
  - Authentication
    - GET Get Token
  - Weather Endpoints
    - GET Get Weather - Single City
    - POST Get Weather - Multiple Cities
    - GET Get Weather - Invalid City (Err...
  - Error Cases
    - GET Unauthorized - No Token
    - GET Unauthorized - Invalid Token
    - POST Bad Request - Empty Cities Ar...
  - GET Health Check
- Weather API Integration Collection
- WU portal api test
- Yosti backend
- Yosti Import & Export API

Weather API Integration - Group 9 / Weather Endpoints / Get Weather - Multiple Cities

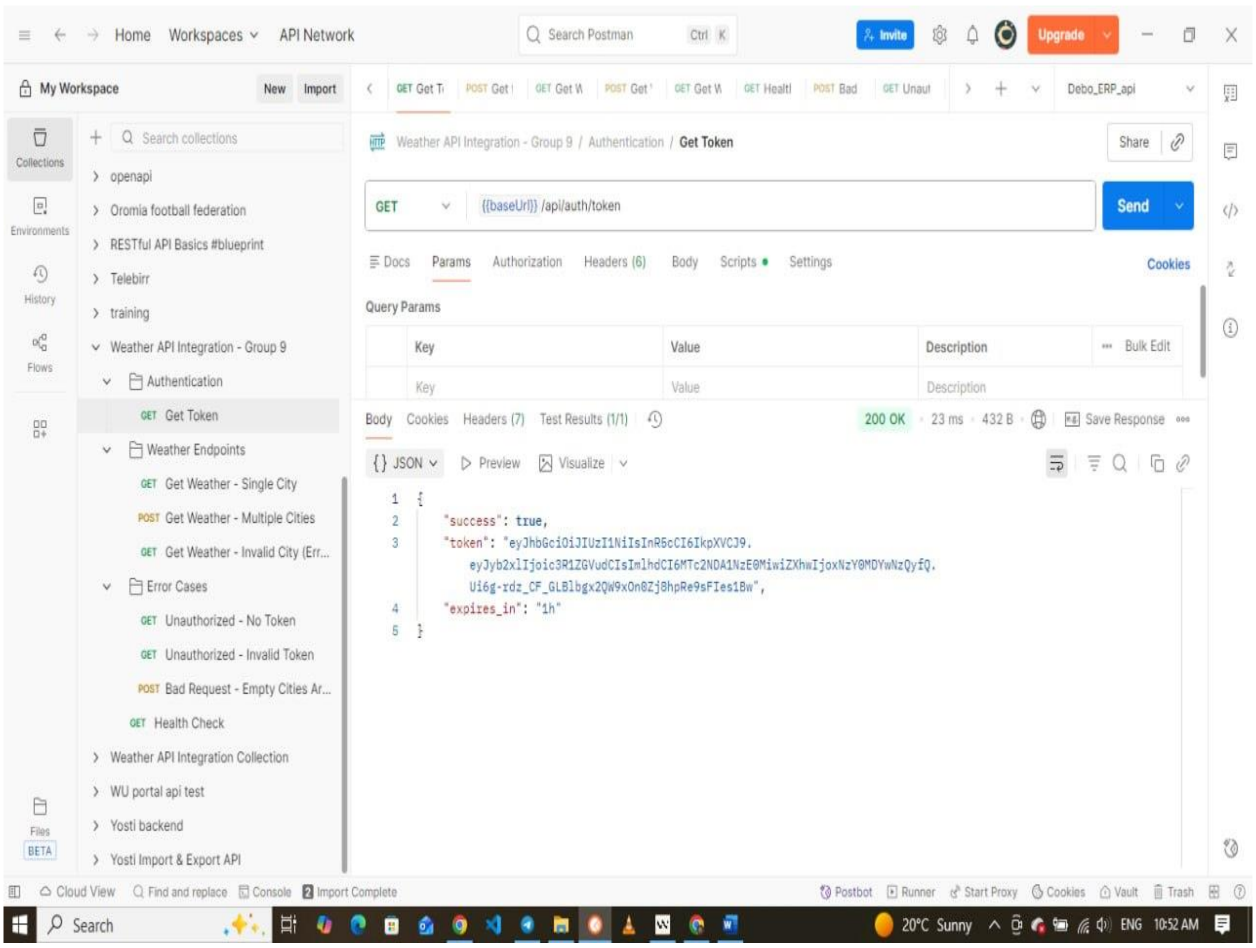
POST {{baseUrl}} /api/weather/multiple

```
{
  "cities": [
    "London",
    "Paris",
    "Tokyo",
    "New York",
    "Sydney"
  ]
}
```

Body · Cookies · Headers (7) · Test Results (3/3) — 200 OK · 1.50 s · 2.36 KB

```
{
    "success": true,
    "count": 5,
    "results": [
        {
            "city": "London",
            "success": true,
            "data": {
                "city": "London",
                "country": "GB",
```

4.3 Screenshot: JWT Token Generation (Login)


Weather API Integration - Group 9 / Authentication / Get Token

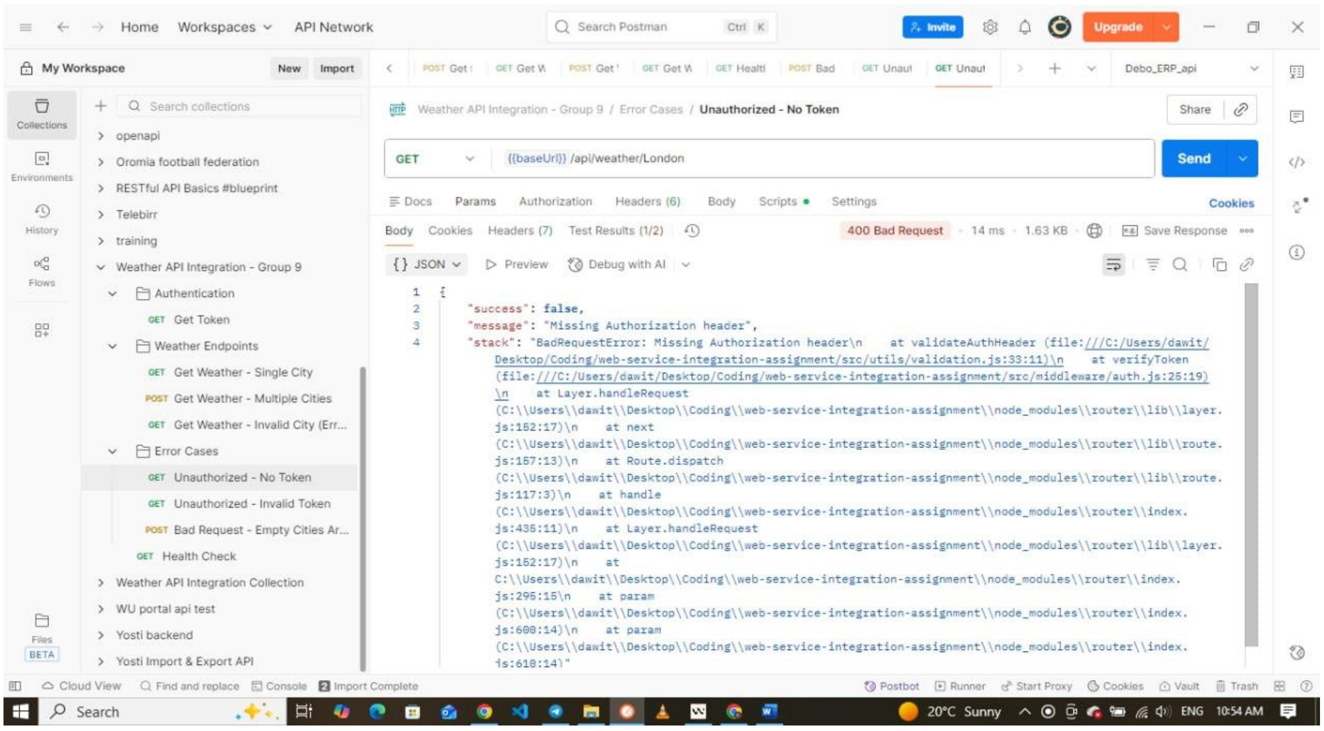
GET {{baseUrl}} /api/auth/token

Body · Cookies · Headers (7) · Test Results (1/1) — 200 OK · 23 ms · 432 B

```
{
    "success": true,
    "token": "eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.
        eyJyb2xlIjoic3R1ZGVudCIsImlhdCI6MTc2NDA1NzE0MiwiZXhwIjoxNzY0MDYwNzQyfQ.
        Ui6g-rdz_CF_GLBlbgx2QW9xOn0Zj8hpRe9sFIes1Bw",
    "expires_in": "1h"
}
```

Home
Workspaces
API Network
My Workspace
openapi
Oromia football federation
RESTful API Basics #blueprint
Telebirr
training
Weather API Integration - Group 9
Authentication
GET Get Token
Weather Endpoints
GET Get Weather - Single City
POST Get Weather - Multiple Cities
GET Get Weather - Invalid City (Err...
Error Cases
GET Unauthorized - No Token
GET Unauthorized - Invalid Token
POST Bad Request - Empty Cities Ar...
GET Health Check
Weather API Integration Collection
WU portal api test
Yosti backend
Yosti Import & Export API
Debo_ERP_api
Send

4.4 Screenshot: Authorization Header (Bearer Token)

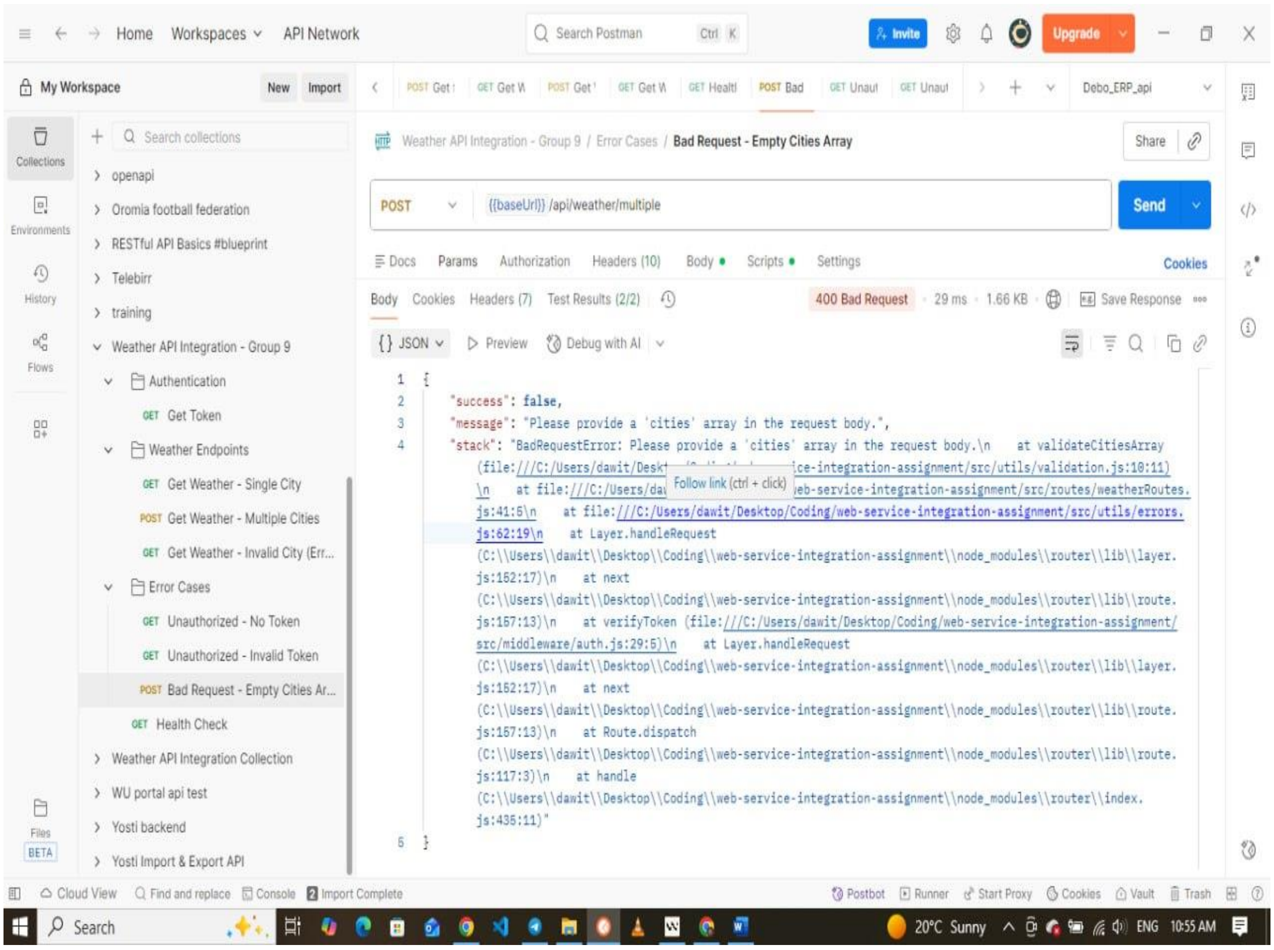

Weather API Integration - Group 9 / Error Cases / Unauthorized - No Token

GET {{baseUrl}} /api/weather/London

400 Bad Request · 14 ms · 1.63 KB

```
{
    "success": false,
    "message": "Missing Authorization header",
    "stack": "BadRequestError: Missing Authorization header\n    at validateAuthHeader (file:///C:/Users/dawit/
        Desktop/Coding/web-service-integration-assignment/src/utils/validation.js:33:11)\n    at verifyToken
        (file:///C:/Users/dawit/Desktop/Coding/web-service-integration-assignment/src/middleware/auth.js:25:19)
        \n    at Layer.handleRequest
        (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\lib\\layer.
        js:152:17)\n    at next
        (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\lib\\route.
        js:157:13)\n    at Route.dispatch
        (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\lib\\route.
        js:117:3)\n    at handle
        (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\index.
        js:435:11)\n    at Layer.handleRequest
        (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\lib\\layer.
        js:152:17)\n    at
        C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\index.
        js:295:15\n    at param
        (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\index.
        js:600:14)\n    at param
        (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\index.
        js:610:14)"
```

4.5 Screenshot: Empty Cities Array

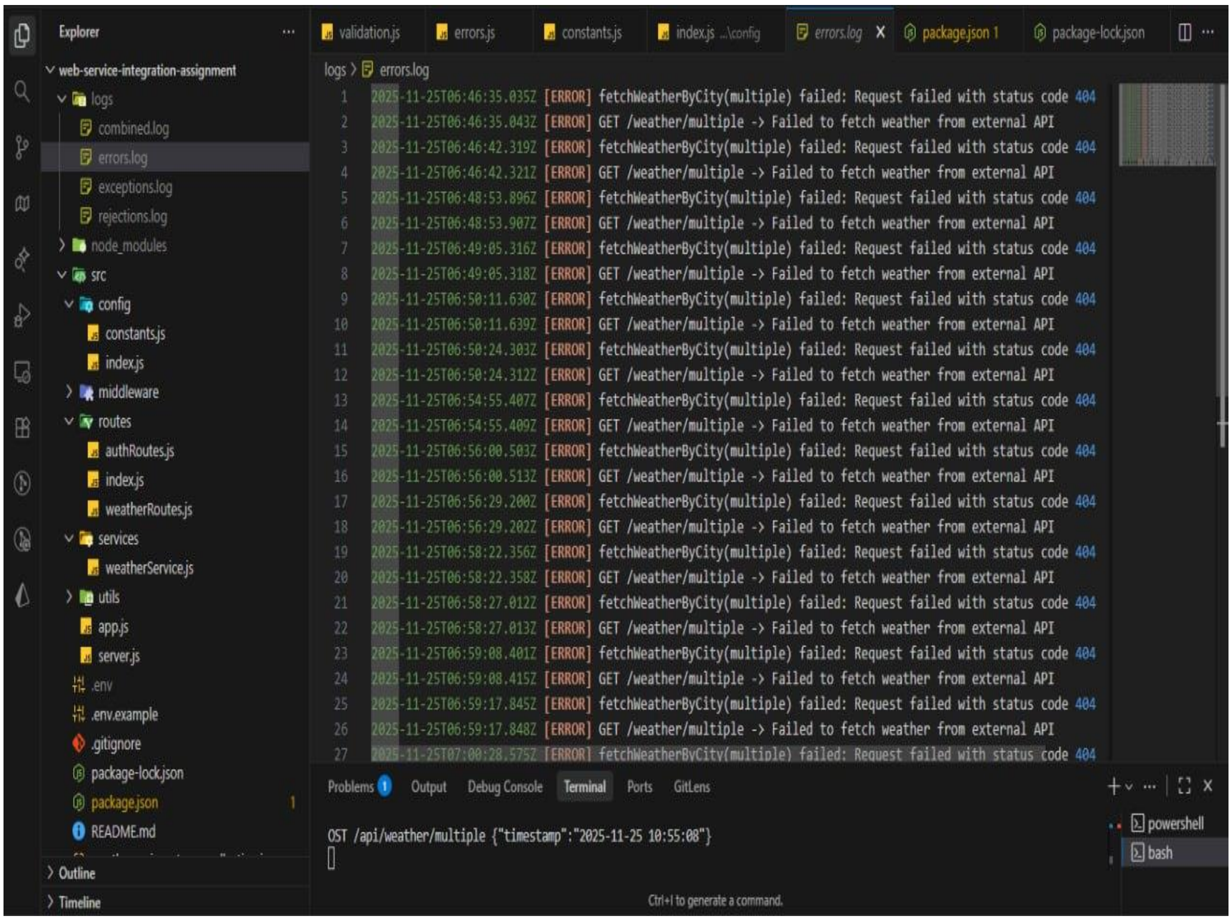

Weather API Integration - Group 9 / Error Cases / Bad Request - Empty Cities Array

POST {{baseUrl}}/api/weather/multiple

400 Bad Request · 29 ms · 1.66 KB

```
{
    "success": false,
    "message": "Please provide a 'cities' array in the request body.",
    "stack": "BadRequestError: Please provide a 'cities' array in the request body.\n    at validateCitiesArray
      (file:///C:/Users/dawit/Desk                  ice-integration-assignment/src/utils/validation.js:10:11)
      \n    at file:///C:/Users/da                 eb-service-integration-assignment/src/routes/weatherRoutes.
      js:41:5\n    at file:///C:/Users/dawit/Desktop/Coding/web-service-integration-assignment/src/utils/errors.
      js:62:19\n    at Layer.handleRequest
      (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\lib\\layer.
      js:152:17)\n    at next
      (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\lib\\route.
      js:157:13)\n    at verifyToken (file:///C:/Users/dawit/Desktop/Coding/web-service-integration-assignment/
      src/middleware/auth.js:29:5)\n    at Layer.handleRequest
      (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\lib\\layer.
      js:152:17)\n    at next
      (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\lib\\route.
      js:157:13)\n    at Route.dispatch
      (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\lib\\route.
      js:117:3)\n    at handle
      (C:\\Users\\dawit\\Desktop\\Coding\\web-service-integration-assignment\\node_modules\\router\\index.
      js:435:11)"
}
```

4.6 Screenshot: Error Log



```
2025-11-25T06:46:35.035Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:46:35.043Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:46:42.319Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:46:42.321Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:48:53.896Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:48:53.907Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:49:05.316Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:49:05.318Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:50:11.630Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:50:11.639Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:50:24.303Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:50:24.312Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:54:55.407Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:54:55.409Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:56:00.503Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:56:00.513Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:56:29.200Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:56:29.202Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:58:22.356Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:58:22.358Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:58:27.012Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:58:27.013Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:59:08.401Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:59:08.415Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T06:59:17.845Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
2025-11-25T06:59:17.848Z [ERROR] GET /weather/multiple -> Failed to fetch weather from external API
2025-11-25T07:00:28.575Z [ERROR] fetchWeatherByCity(multiple) failed: Request failed with status code 404
```

```
OST /api/weather/multiple {"timestamp":"2025-11-25 10:55:08"}
```

5. Conclusion

This project successfully fulfills all requirements of the Web Services Integration assignment. It demonstrates secure API integration, proper error handling, data transformation, and logging

This assignment offered hands-on experience in integrating external web services into a backend system using Node.js and Express. Through the implementation of JWT authentication, secure API communication, and structured project architecture, we gained practical understanding of service integration and backend development. The collaborative workflow on GitHub also provided real-world exposure to version control, branch management, and team-based software development practices.